Prepare Mineral Samples – RPL Kit questions (Q.1-6 answered)

Questions	**Key points to be addressed by the candidate**
1. How do you interpret and schedule client samples?	☐ Review client request to identify sample/analysis requirements, preparation methods and equipment involved; ☐ Inspect samples, compare with specifications, record and report any discrepancies; ☐ Liaise with client when samples and/or request forms do not comply with enterprise procedures; ☐ Plan parallel work sequences to optimise throughput of multiple sets of samples
2. What are the main hazards and enterprise controls associated with the sample, preparation methods, reagents and equipment?	☐ Identify hazards and enterprise controls associated with the sample, preparation methods, reagents and equipment; ☐ check equipment materials, reagents and are fit for purpose;
3. Describe how to prepare two different types of mineral samples, explain both destructive and non-destructive methods	For example: Comminution – ☐ Estimate safe times for the preparation of required sample proportions; ☐ Split samples to obtain representative sub-samples as required; ☐ Safely operate comminution equipment; ☐ Monitor sample compaction and build-up of residues on equipment; ☐ Label samples and record chain of custody information, store non-destructive –

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	☐ identify critical steps that will affect the quality of analytical results; ☐ attend to safety, precision and minimisation of cross-contamination of samples; ☐ Present laboratory portions for analysis in appropriate containers with all required chain of custody documentation ☐ store
4. How do you know you have prepared the sample appropriately?	☐ Monitor texture of the samples as an indicator of particle size and adjust milling times accordingly; ☐ Record preparation difficulties that may impact on quality or cause additional client costs; ☐ Report any departure from preparation methods or client specifications; ☐ identify completion or failure of each preparation step take corrective action before repeating the procedure,
5. How do you clean equipment between samples?	☐ remove excess sample by tapping, brushing or Air-pressure; ☐ reduce cross-contamination by using a small amount of next sample or quartz sand etc.
6. How is waste minimised and spent/surplus samples disposed of?	☐ Follow procedures to reduce need for repeating work ☐ Mineral samples collected for correct disposal, returned to customer, or recycled

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7. What is sodium peroxide used for?	
8. What are the safety issues/hazards involved in the use of sodium peroxide?	
9. An ore sample contains ‘free’ particles of metallic gold. What is an appropriate method to process/prepare samples with metallic present?	
10. Describe the ‘wet ashing’ technique. (What acids are involved?). When is this technique to be used over the ‘dry ashing’ method?	
11. Describe the ‘dry ashing’ technique. What are its limitations?	
12. What is the main hazard in using DIBK in a lab?	
13. Why is it important samples are dry prior to preparation or analysis?	

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14. Describe the following terms: • Homogeneous • Heterogeneous • Integrity • Segregation • Ore • Gangue • Refractory	
15. Write a chemical reaction for the roasting of iron sulphide (FeS) in air (O_2).	
16. Why is it important gold samples (during the aqua regia digestion procedure) don’t go to dryness?	
17. How can arsenic be detected during the roasting process?	
18. How would you know if your sample contains high levels of nickel?	

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19. Why is temperature control important during acid digestion?	
20. If an analyst wanted to completely dissolve a sample, what acid mixture would be used?	
21. What hazards are associated when using an air-gun?	
22. Why are samples given a quartz wash between samples?	
23. What are the main hazards associated with the use of hydrofluoric acid?	
24. What is the main purpose of HF during an acid digest of a mineral sample?	
25. What safety equipment is required when using HF in a chemical laboratory?	
26. What is required in all laboratories in case of a HF burn on a laboratory worker?	
27. What are the main hazards associated with the use of perchloric acid?	

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28. What acids (and ratios) are required in the preparation of aqua regia?	
29. Calculate the volume of 1000ppm Fe stock solution required to make 200mL of 50ppm Fe.	
30. A rotary splitter reduces? (State the correct answer) A – particle size B – sample size	
31. A riffle splitter reduces? (State the correct answer) A – particle size B – sample size	
32. A rotary splitter reduces? (State the correct answer) A – particle size B – sample size	
33. A ring mill reduces? (State the correct answer) A – particle size B – sample size	

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34. A jaw crusher reduces? (State the correct answer) A – particle size B – sample size	
35. What material are the metallic crucibles made out of for the fusion process?	
36. How can graphite appear in samples during the digestion process?	
37. How man magnetite be detected during the digestion process?	
38. What is the preferred analytical method if client samples contain magnetite, chromite, ilmenite or other refractory type minerals?	
39. What is the desired particle size (in µM) required for analysis? What consistency should this feel like?	
40. What is the best course of action if a sample has become contaminated?	
41. State the best method for the long term storage of mineral samples.	

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42. What would be the concentration of gold be in a 5mL DIBK layer after extraction of 100mL of an aqueous gold solution containing 0.35ppm Au?	
43. How can a lab technician know if sulphides are present in a sample?	
44. State which of the following elements are removed by the roasting process: • Bismuth (Bi) • Mercury (Hg) • Iron (Fe) • Manganese (Mn) • Tellurium (Te) • Silver (Ag) • Platinum (Pt) • Lead (Pb) • Silicon (Si) • Calcium (Ca) • Arsenic (As) • Chromium (Cr) • Sulphur (S) • Copper (Cu) • Selenium (Se) • Phosphorus (P) • Antimony (Sb)	

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45. What are the main risks associated with the preparation of nickeliferous ores in a laboratory? Once the risk has been identified, what would you do as an operator?	
46. List the hazards that are present in a sample preparation lab? Out of the list, what two are of prime concern?	
Required Knowledge What is the chemical composition of some common ore minerals and what are the geological features where they are usually found? Explain the terms: homogeneous, heterogeneous, integrity and segregation Discuss one chemical preparation method for mineral samples include chemical reactions, effects of reagents on the element of interest, reaction and recovery rates, and solubility.	